Spot Safety Project Evaluation

Project Log # 200704279

Spot Safety Project # 04-01-244

Spot Safety Project Evaluation of the Traffic Signal Installation at SR 1602 (Charleston Rd) and SR 1607 (Stantonsburg Rd) in Wilson County

Documents Prepared By:

Safety Evaluation Group
Traffic Safety Systems Management Section
Traffic Engineering and Safety Systems Branch
North Carolina Department of Transportation

Principal Investigator

_____ 3/13/08

Samuel D. Coleman, EI Date

Traffic Safety Project Engineer

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 04-01-244 – Traffic Signal installation at SR 1602 (Charleston Rd) and SR 1607 (Stantonsburg Rd) in Wilson County.

Project Information and Background from the Project File Folder

SR 1607 (Stantonsburg Rd) is a two lane roadway with a left turn lane on both approaches and a 45 mph speed limit. The left turn lanes on SR 1607 (Stantonsburg Rd) were added as part of a spot safety project number 04-93-049 in September 2000. SR 1602 (Charleston Rd) is a two lane roadway with a left turn lane on the east approach. The speed limit is 35 mph on the east leg and 45 mph on the west leg of the intersection. The intersection was controlled by a stop condition on SR 1602 during the before period.

The original problem statement shows there were a high number of students that used both routes to get to school. The mix on passenger vehicles and trucks in this industrial area resulted in angle crash patterns. There were 18 total crashes from 1/1/1997 to 10/31/1999, in which 13 were considered correctable. The countermeasure chosen to alleviate the problem was to install a fully actuated traffic signal. The traffic signal installation was completed on 8/1/2002 at a cost of $50,000.

Naive Before and After Analysis

After reviewing the spot safety project file folder along with all the crashes along the subject road, the crash data omitted from this analysis to consider for an adequate construction period was from August 2000 through October 2000 for the left turn lanes on SR 1607 and July 2002 through September 2002 for the traffic signal. The before period consisted of reported crashes from January 1, 1998 through July 31, 2000 (2 years, 7 months), the before period (left turn lanes) consisted of reported crashes from November 1, 2000 through June 30, 2002 (1 year, 8 months), and the after period consisted of reported crashes from October 1, 2002 through March 31, 2007 (4 years, 6 months). The ending date for this analysis was determined by the available crash data at the time the crash analysis was completed.

The treatment data consisted of all crashes within 150 feet of the subject intersection. The following data table depicts the Naive Before and After Analysis for the above information. Please note that Frontal Impact crash types influenced by the implemented countermeasure were the target crashes for the treatment location. These crash types considered are as follows: Left Turn, same roadway; Left Turn, different roadway; Right Turn, same roadway; Right Turn, different roadway; Head On, and Angle. The target crashes are clearly identified in the before and after period collision diagrams.

Treatment Information			
	Before	**Turn Lanes Added**	**After**
Total Crashes/Yr	12.0	3.6	3.6
Total Severity Index	6.3	4.7	5.6
Target Crashes/Yr	7.8	3.0	1.3
Target Severity Index	6.2	5.4	8.4
Volume	5200	4800	5400
Treatment Injury Crashes			
	Before	**Turn Lanes Added**	**After**
Fatal Injury Crashes/Yr	0.0	0.0	0.0
Class A Injury Crashes/Yr	0.0	0.0	0.0
Class B Injury Crashes/Yr	2.3	0.6	0.9
Class C Injury Crashes/Yr	6.2	1.2	1.3
PDO Crashes/Yr	3.5	1.8	1.3
Target Injury Crashes			
	Before	**Turn Lanes Added**	**After**
Fatal Injury Crashes/Yr	0.0	0.0	0.0
Class A Injury Crashes/Yr	0.0	0.0	0.0
Class B Injury Crashes/Yr	1.2	0.6	0.7
Class C Injury Crashes/Yr	4.3	1.2	0.7
PDO Crashes/Yr	2.3	1.2	0.0

Table 1.

The naive before and after analysis at the treatment location resulted in a decrease in Total Crashes/Yr, a decrease in Frontal Impact Crashes/Yr, and an increase in Average Daily Traffic (ADT). The before period ADT year was 1999, the turn lanes added period ADT year was 2001, and the after period ADT year was 2005.

Results and Discussion

The summary results above demonstrate that the treatment location appears to have had a decrease in the number of Total Crashes/Yr and a decrease in the number of Frontal Impact Crashes/Yr from the before to the after period.

The project as a whole has been successful at reducing angle collisions at this intersection. There are two before period collision diagrams included to illustrate the turn lanes that were added in September 2000. Referencing the before period collision diagrams, it can be seen that after adding turn lanes the angle crashes decreased. Referencing the after period collision diagram, the angle crash pattern was alleviated.

The only pattern that exists in the after period are ran off road crashes. There are four crashes that occurred over a 4.5 year period that may be a result of signalizing the intersection. The vehicles seemed to have lost control crossing SR 1607 when traveling east on SR 1602. The photos clearly show a building when driving east on SR 1602 letting the driver know the road curves ahead. Due to the fact that 3 of the 4 ran off road crashes occurred at night there may need to be some warning of the curve SR 1602 takes after crossing the intersection.

As the Safety Evaluation Group completes additional spot safety reviews for this type of countermeasure, we will be able to provide objective and definite information regarding actual crash reduction factors for this type of road.

TREATMENT SITE BENEFIT-COST ANALYSIS

LOCATION: SR 1602 and SR 1607 BY: S Coleman
COUNTY: Wilson DATE: 3/5/2008
FILE NO.: SS 04-01-244

DETAILED COST: TYPE IMPROVEMENT - Signal Installation

ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST
Construction	$50,000	10	0.149	$7,451
	$0	0	0.000	$0
Right-of-Way	$0	0	0.000	$0
TOTALS	$50,000	10	0.149	$7,451

ESTIMATED INCREASE IN ANNUAL MAINT. COST = $2,200
ESTIMATED INCREASE IN ANNUAL UTILITY COST = $900

TOTAL ANNUAL COST= $10,551
TOTAL COST OF PROJECT= $50,000

COMPREHENSIVE COST REDUCTION:

ESTIMATED NUMBER OF ANNUAL ACCIDENT DECREASES

TIME PERIOD	YEARS	K & A CRASHES	K & A CRASHES PER YR	B & C CRASHES	B & C CRASHES PER YR	PDO CRASHES	PDO CRASHES PER YR	ANNUAL COSTS
BEFORE	4.50	0	0.00	26	5.78	13	2.89	$121,622
AFTER	4.50	0	0.00	10	2.22	6	1.33	$47,689

Annual Benefits from Crash Cost Savings $73,933

NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST = $63,382

BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST = 7.01

TOTAL COST OF PROJECT - $50,000 COMPREHENSIVE B/C RATIO - 7.01

TARGET CRASH BENEFIT-COST ANALYSIS

LOCATION: SR 1602 and SR 1607 BY: S Coleman
COUNTY: Wilson DATE: 3/5/2008
FILE NO.: SS 04-01-244

DETAILED COST: TYPE IMPROVEMENT - Signal Installation

ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST
Construction	$50,000	10	0.149	$7,451
	$0	0	0.000	$0
Right-of-Way	$0	0	0.000	$0
TOTALS	$50,000	10	0.149	$7,451

ESTIMATED INCREASE IN ANNUAL MAINT. COST = $2,200
ESTIMATED INCREASE IN ANNUAL UTILITY COST = $900

TOTAL ANNUAL COST= $10,551
TOTAL COST OF PROJECT= $50,000

COMPREHENSIVE COST REDUCTION:

ESTIMATED NUMBER OF ANNUAL ACCIDENT DECREASES

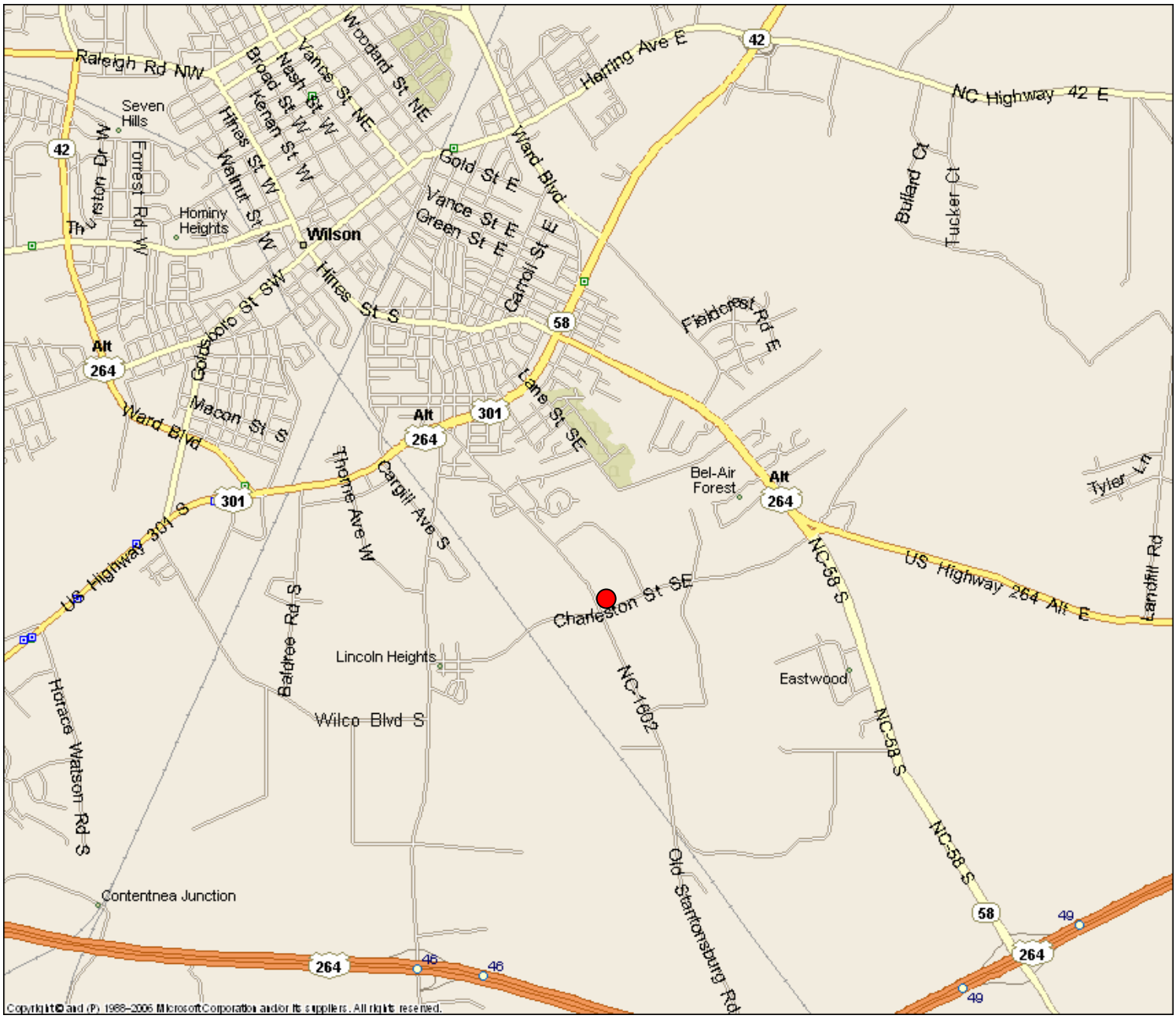
TIME PERIOD	YEARS	K & A CRASHES	K & A CRASHES PER YR	B & C CRASHES	B & C CRASHES PER YR	PDO CRASHES	PDO CRASHES PER YR	ANNUAL COSTS
BEFORE	4.50	0	0.00	17	3.78	9	2.00	$79,978
AFTER	4.50	0	0.00	6	1.33	0	0.00	$25,333

Annual Benefits from Crash Cost Savings $54,644

NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST = $44,093

BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST = 5.18

TOTAL COST OF PROJECT - $50,000 COMPREHENSIVE B/C RATIO - 5.18



Location Map: SR 1602 (Charleston Rd) and SR 1607 (Stantonsburg Rd). in Wilson County.

Treatment Site Photos taken November 1, 2007

Driving east on SR 1602

Driving east on SR 1602

Driving west on SR 1602

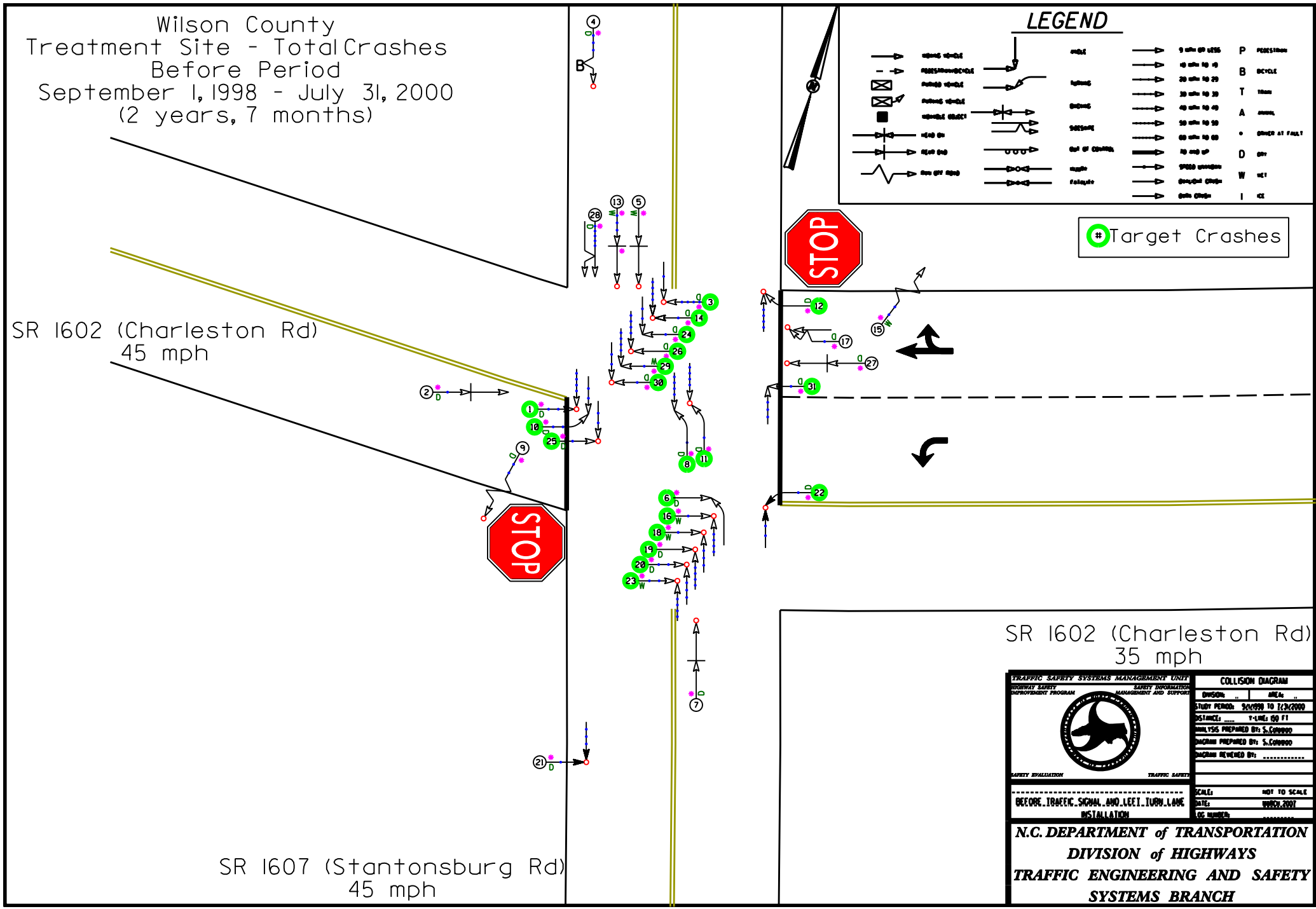
Driving west on SR 1602

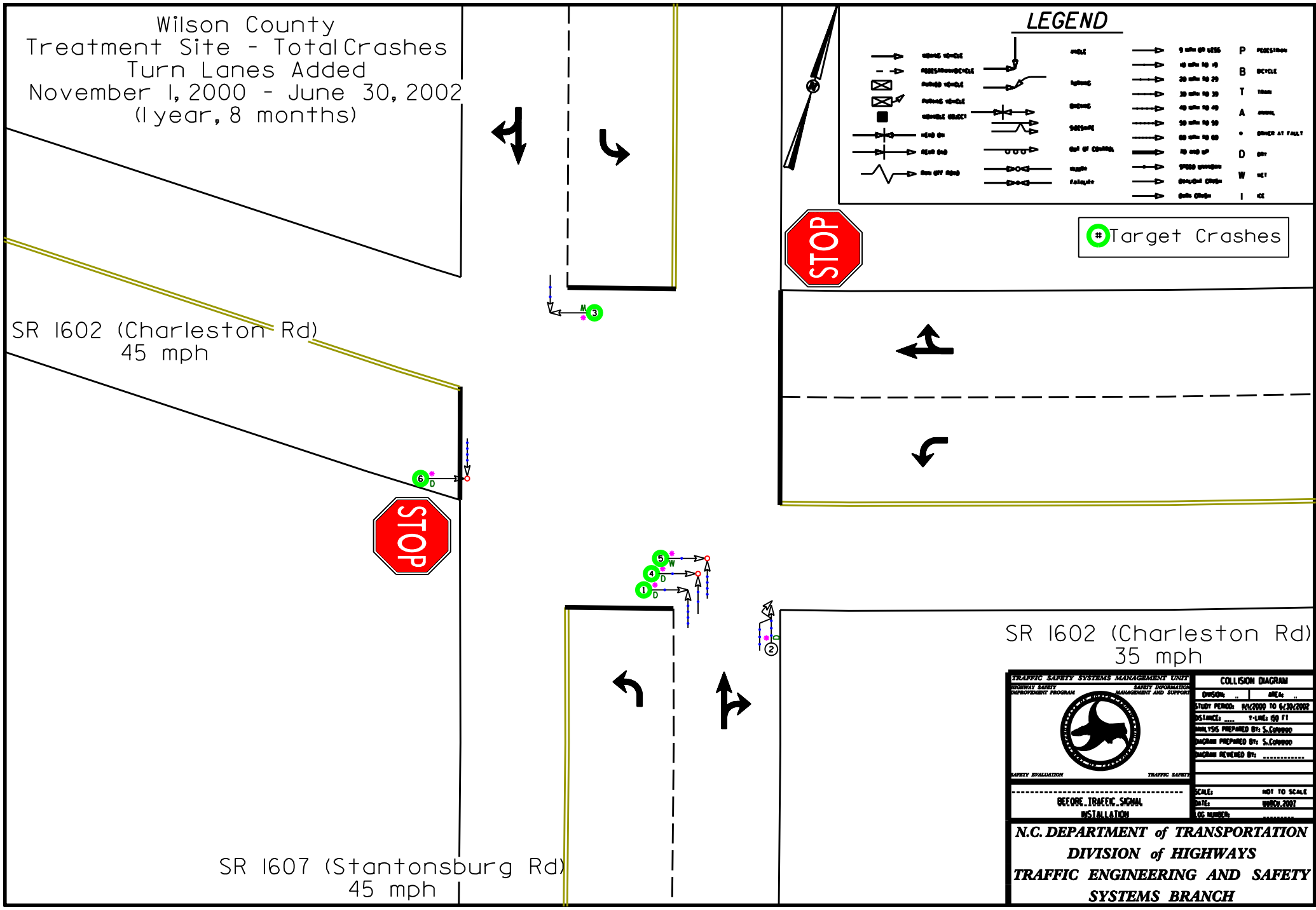
Driving south on SR 1607

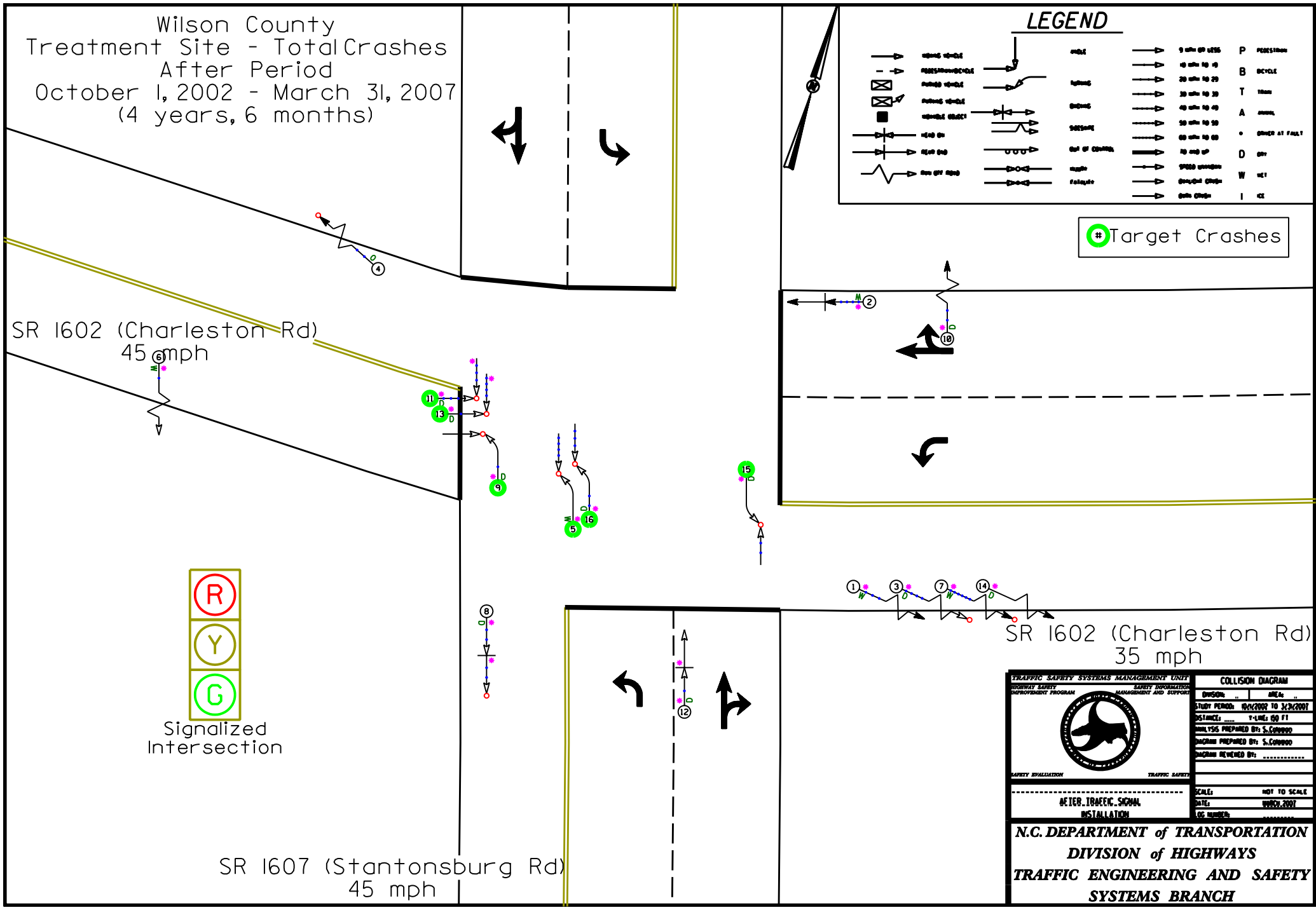
Driving south on SR 1607

Driving north on SR 1607

Driving north on SR 1607


Wilson County
Treatment Site - Total Crashes
Before Period
September 1, 1998 - July 31, 2000
(2 years, 7 months)
LEGEND
Target Crashes
SR 1602 (Charleston Rd)
45 mph
SR 1607 (Stantonsburg Rd)
45 mph
SR 1602 (Charleston Rd)
35 mph
STOP
STOP
TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT
COLLISION DIAGRAM
BEFORE TRAFFIC SIGNAL AND LEFT TURN LANE INSTALLATION
N.C. DEPARTMENT of TRANSPORTATION
DIVISION of HIGHWAYS
TRAFFIC ENGINEERING AND SAFETY SYSTEMS BRANCH


Wilson County
Treatment Site - Total Crashes
Turn Lanes Added
November 1, 2000 - June 30, 2002
(1 year, 8 months)
SR 1602 (Charleston Rd)
45 mph
STOP
STOP
LEGEND
Target Crashes
SR 1602 (Charleston Rd)
35 mph
SR 1607 (Stantonsburg Rd)
45 mph
TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT
HIGHWAY SAFETY IMPROVEMENT PROGRAM
SAFETY INFORMATION MANAGEMENT AND SUPPORT
SAFETY EVALUATION
TRAFFIC SAFETY
COLLISION DIAGRAM
BEFORE TRAFFIC SIGNAL INSTALLATION
N.C. DEPARTMENT of TRANSPORTATION
DIVISION of HIGHWAYS
TRAFFIC ENGINEERING AND SAFETY SYSTEMS BRANCH


Wilson County
Treatment Site - Total Crashes
After Period
October 1, 2002 - March 31, 2007
(4 years, 6 months)
LEGEND
Target Crashes
SR 1602 (Charleston Rd)
45 mph
SR 1602 (Charleston Rd)
35 mph
SR 1607 (Stantonsburg Rd)
45 mph
R
Y
G
Signalized
Intersection
TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT
COLLISION DIAGRAM
AFTER TRAFFIC SIGNAL
INSTALLATION
N.C. DEPARTMENT of TRANSPORTATION
DIVISION of HIGHWAYS
TRAFFIC ENGINEERING AND SAFETY
SYSTEMS BRANCH